

TEST 2

Undergraduates not in the combined Bachelor-Master program: *In groups of 2 or 3, but different*
Graduates and Undergraduates in the combined Bachelor-Master program: *Individual*
 First Discussion session (in my office) no later than Feb 26. This discussion session should be over ALL difficulties noticed. Test due on March 1. Make appointments.

Consider the grassroots design of a crude unit. Succinct report please!!! Stream info and economic data follow (same as in test 1).

Hot Streams

	TCR	MCR	LCR	KERO	LGO	HGO	OVHD	HVGO	LVGO	SR1	SR2	SRQ
Fcp [kW/C]	106.20	117.81	233.98	33.79	31.98	25.05	122.69	130.94	47.40	66.32	28.23	24.20
Tin [C]	140.18	210.00	303.56	170.11	248.82	276.98	117.71	250.55	178.55	359.97	290.00	359.55
Tout [C]	39.53	162.98	270.23	60.00	110.00	121.91	50.00	90.00	108.87	290.00	115.00	280.00
h [kW/C.m ²]	0.26	0.33	0.41	0.45	0.72	0.57	0.72	0.26	0.60	0.47	0.47	0.47

Cold Streams

	C1	C2	C3	C4	C5	C6	C7	C8	C9	C10	C11	C12
Fcp [kW/C]	200.04	223.73	228.00	230.91	236.67	246.35	255.25	265.83	328.06	371.49	373.8	413.6
Tin [C]	30.00	130.00	145.00	153.74	161.90	185.00	216.66	234.84	270	290	310	330
Tout [C]	130.00	145.00	153.74	161.90	185.00	216.66	234.84	270.00	290	310	330	350
h [kW/C.m ²]	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9

The system has two cold streams. The second cold stream is represented by piece wise sections (C2-C12) because the FCP varies with temperature (the stream vaporizes).

Economic Data

Furnace Utility Costs (\$/Kw-yr)	\$100.00	Maximum area per shell (m ²)	500
Area addition costs (\$/m ²)	\$271.20	Installation cost as % of equipment cost	50%
Fixed exchanger cost (\$)	\$17,129	Furnace Efficiency	80%

1) Use the Transshipment model to obtain a network. (Use the same HRAT as in the targeting phase of Test 1 using match dependent U values). Compare your results with your choices (or revised choices of the PDM).

2) Use the Stages model to obtain a heat exchanger network.

- Run the model above and below the pinch and compare with PDM and Transshipment results. Use the same utility as in those cases.
- Run the model for the whole network without area costs, now with utility usage being free. Vary the ratio of the cost of energy to the fixed cost of exchangers to obtain different networks.
- Vary the value of EMAT and see what the effect is.
- Add the area equations and run the model without any initial values. Always use match dependent U values.
- Try using the results of the model without areas as initial point (duties and temperatures) to see if different results are obtained.